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SCIENTIFIC BOOKS.

THE MESOZOIC FLORA OF THE UNITED STATES.\*

THE great activity in paleobotanical research which characterizes the work of the U. S. Geological Survey finds renewed expression in the recently issued 'Status of the Mesozoic Floras of the United States,' by Professor Ward, with the collaboration of Professor W. M. Fontaine, Mr. Atreus Wanner and Dr. F. H. Knowlton. Without attempting a republication of results which have already appeared, the author aims to present a 'succinct account of the progress thus far made in the direction of developing the Mesozoic Floras of the United States,' enumerating for the several formations, geographical areas and special localities the fossil plants that have been found, and also giving a complete bibliography of the work accomplished, with special reference to correlation. Questions of expediency have necessitated a division of the work into two parts. The first of these to which our attention is now directed discusses the Older Mesozoic, while the second part will deal with the Younger Mesozoic or Cretaceous.

The Triassic flora is represented by a description of seventy-six species or forms, of which nineteen are recorded for the first time, and among these latter is to be noted the name of a new genus—*Yorkia*—which has been given by Mr. Wanner and provisionally adopted by Professor Ward to identify a possible grass which is not very clearly defined as such by the figures given, although the latter are very suggestive of a plant of Monocotyledonous type which serves to recall the *Poacites* of Saporta.

The incompleteness of the paleobotanical

\* Ward, Lester F., Status of the Mesozoic Floras of the United States. The Older Mesozoic. Second Annual Report of the U. S. Geol. Surv., 1898-99. Washington, 1900. Pp. 215-430. Plates XXI.-CLXXIX.

record, especially with respect to the earlier periods, and the uncertainty which exists relative to precise limitations as defined by the vegetation, lead the author to treat the American Trias as a geographical unit, between which and any of the recognized European series it has as yet been impossible to establish exact correlation, but it is worthy of remark that not only are the plants of the European Trias most numerous in the uppermost number of the series, *i. e.*, in the transition beds or the Rhetic, but that all the fossil plants of the American Trias have their nearest affinities in Europe, with those of the latter formation.

The principal plant-bearing deposits of the American Trias are to be found in the Connecticut Valley, near Richmond, Virginia, and in North Carolina. They are also extensive in New Mexico and Arizona, extending into Utah, Nevada and Colorado, and probably also into the Indian Territory and Texas. They also appear in California in the well-known beds at Oroville. The Pennsylvania area was very carefully studied by Mr. Wanner, whose material was revised by Professor Fontaine, and for a total of thirty-one species shows Filices 10, Equisetaceæ 1, Cycadaceæ 10, Bennettitaceæ 1, Ginkgoales 1, Coniferæ 7 and Monocotyledons (?) 1.

In the Virginia area the work of Professor Fontaine led Dr. Stur, of the Austrian Geological Survey, to identify many of the species with plants from the European Keuper, whence he concludes that the Trias of Virginia and that of Lunz are of the same age.

The most complete and noteworthy collection of plants from the older Mesozoic is that of Dr. Emmons from North Carolina, deposited in the museum of Williams College, where they were subsequently studied by Professor Fontaine with the result that it was found to contain Filices 10, Equisetaceæ 2, Cycadaceæ 14, Bennettitaceæ 1, Ginkgoales 1, Coniferæ 6 and of doubtful affinity 4, in a total of thirty-eight forms. Comparing this list with that obtained from Pennsylvania, a remarkable correspondence between the representatives of the different families is here noted.

One of the most notable features of the southwestern area is to be found in the very

abundant remains of trees which have become silicified and form the well-known 'Petrified Forest of Arizona.' These remarkably well preserved remains have already been fully described in a special memoir by Professor Ward, and they are now dealt with only so far as is necessary to connect them with the special subject under discussion. The wood has been identified by Knowlton as that of *Arancorioxylon Arizonicum*.

The Jurassic flora embraces a description of fifty-two species, of which three only are recorded for the first time. About half of these species are embraced in the Oroville flora of California and include Filices 13, Cycadaceæ 10, Ginkgoales 1, Coniferæ 3 and unknown 1; while the remaining twenty-four from the Jurassic of Wyoming represent Cycadaceæ 22, Coniferæ 2.

Of the 28 species in the Oroville flora, only 12 are to be regarded as of definite value in the determination of geological age. Of these *Cladophlebis spectabilis*, *C. arguluta*, *C. whitbiensis tenuis* var. *a*; *Thyrsopteris Maakiana*, *Podozamites lanceolatus*, *P. lanceolatus latifolius* and *Pinus Nordenskioldi* were determined by Heer to be characteristic of the Jurassic in a horizon equivalent to the Lower Oolite of Scarborough, whence it becomes of special interest to observe that Seward\* refers to the occurrence of *Cladophlebis whitbiensis*, *Thyrsopteris Maakiana* and *Podozamites lanceolatus*. *Cladophlebis whitbiensis* he now recognizes as properly identical with *Todites Williamsoni* of Brongniart, a species of wide distribution in the Jurassic of Europe, Greenland and Siberia and characteristic of the Yorkshire Oolite. *Thyrsopteris Maakiana* he identifies with *Coniopteris hymenophylloides*, which occurs in the Jurassic of Siberia and also constitutes one of the most characteristic species in the Oolite of the Yorkshire Coast. *Podozamites lanceolatus* has an exceptionally world-wide distribution, and is especially characteristic of the Jurassic strata. The *Pagiophyllum* type of conifer which is highly characteristic of the Jurassic, is represented in the Oroville series by *P. Williamsoni* as the only conifer of importance; while in Europe and China, as also in the

\* 'Catalogue of Mesozoic Plants,' British Museum, 1900.

Yorkshire flora, it is a characteristic element of the lower Oolite.

*Sagenopteris Nilsoniana*, while found in the Oroville flora, is most characteristic of the Rhetic, and it does not occur in the Yorkshire Oolite, where its nearest representative is *S. Phillipsi* of Brongniart. Its reference to the Oroville horizon is regarded by Ward with some doubt, hence it can not be held to have much weight as a factor in determining age.

The author concludes his valuable contribution by a tabular view of the distribution of 188 separate forms of Lower Mesozoic plants, showing their relation to the various North American areas both of the Triassic and Jurassic formations. He thereby gives emphasis to the fact that remarkably few species (three) are common to both formations, while even the majority of these are open to question. A comparison of the flora of the Yorkshire Oolite with the Jurassic of North America shows that with respect to the Filices and the Coniferæ there is a close correspondence in relative number of representatives, but that in the North American Jurassic there is a pronounced preponderance of the Cycadaceæ. In the latter flora also, both Bryophyta and Equisetales appear to be wanting.

	Inferior Oolite of Yorkshire.	North American Jurassic.
Bryophyta,	1	0
Equisetales,	2	0
Filices,	20	15
Cycadales	23	30
Coniferæ,	9	7

D. P. PENHALLOW.

MONTREAL, May, 1901.

*Steam-boiler Economy.* A Treatise on the Theory and Practice of Fuel Economy in the Operation of Steam-Boilers. By WILLIAM KENT, A.M., M.E. New York and London, John Wiley & Sons and Chapman & Hall. 1901. 8vo. Pp. xiv + 458. Price, \$4.00.

This is a work, by an authority in its field, devoted to the study, theoretical, practical and experimental, of steam-boiler economics. Its author has had a long and varied experience of the most valuable kind in this department of mechanical engineering and in related fields of work, study and research. To this peculiarly

happy practical and theoretical acquaintance with this subject he has added a singularly exceptional talent for the work and an unusually thorough technical preparation for its prosecution. Large experience, as an author and as an editor, and in the preparation of professional reports as expert in this and related matters, has given him the ability to digest, to formulate and to logically plan and execute a piece of technical work of high grade. The outcome of his endeavor is an exceptionally condensed, complete and exact treatise. The author has also confined himself very closely to his restricted title, and the reader will find there precisely what he seeks.

The book is not only well constructed, but it adds to existing knowledge, as presented in the text-books and special treatises as commonly written, some very valuable novelties which have peculiar interest to the professional man and the student. For example, maps are given of the coal-fields of the country and the distribution of the fossil fuels is exhibited clearly; while accompanying tables of composition, very full and officially endorsed, show what variations of quality occur as we pass from the graphitic anthracites of Rhode Island and Massachusetts, across the Pennsylvania beds over the remarkable deposits of West Virginia and into the Alabamian district, or across Ohio, Indiana and Illinois, Tennessee and Kentucky deposits into the regions of the friable fuels of the Rocky Mountains and to the Pacific Coast, with its extensive distribution of lean coals and lignites.

Mr. Kent has constructed some remarkably valuable as well as novel graphic illustrations of the laws connecting composition with efficiency with varying intensities of draught and variations of air-supply, and has done much to reconcile the widely differing conclusions of investigators in this department of scientific research, who are now coming to be numerous and industrious, commensurately with a growing recognition of the importance of the subject. He has given us a larger addition to our systematized knowledge, and has added to our obligations by introducing well-established and new and useful formulas and diagrams, expressing the relations of conditions bearing upon and

determining efficiency. The discussion of 'temperature and fire' is extended and good; that of the problem of smoke prevention, the account of the automatic stoker and the full elaboration of useful algebraic formulas are points of excellence deserving of special mention. The revelation of the effect of varying air-supply with variations of the rate of combustion is new and important as here presented, and the exposition of the value of flue-gas analysis is effected in an excellent fashion.

For a first edition, this seems exceptionally free from typographical or other errors, and it may be taken for granted that later editions will follow from which even these minor defects will be completely pruned.

The book-making is good, and the maps are printed upon a fine grade of paper to insure clearness. Many of the illustrations and nearly all the diagrams are new, and the whole constitutes a work which is likely to have extensive sale among professionals and professional schools. The mathematical work and the discussions of results of boiler-tests, of which the records are presented very fully, will find constant use.

R. H. THURSTON.

*A Reader in Physical Geography.* By RICHARD E. DODGE. New York, Longmans Green & Co. 1900. 12mo. Pp. viii + 237. Price, 70 cents.

It is gratifying to see the new point of view in physical geography coming into our education and our literature. The application of the theory of evolution to all branches of the subject has taken it bodily from the static condition in which it was conceived by our fathers, and reestablished it as a dynamic science, live and growing. There are no longer any 'everlasting hills,' but mountains and vales wax and wane, and record the histories of their mutations in the landscape so legibly that he who runs may read. And man comes on the scene, molded inevitably by the geographic environment in which his lot is cast, and in turn reacts upon that environment in many important ways. This is the outlook Professor Dodge has in his little volume. He has written it for beginners, and his fine quality as an instructor

is in evidence on almost every page. He is very happy in his ability to interpret the principles of land sculpture in the most homely similes. The beginner not only may, he must, relate the new knowledge to what is already well known to him.

The topics treated are, The Continents, The Industries of Men, The Origin of Land Forms, The Great Land Forms, Climate and other important physical features influencing man.

The book is intended as auxiliary reading for beginners in physiography, but it will also make good reading for the laity in other lines, who wish to know the way in which a physiographer looks at his problems.

J. PAUL GOODE.

*Air, Water and Food.* By ELLEN H. RICHARDS and ALPHEUS G. WOODMAN. New York, John Wiley & Sons. Pp. 230. Price \$2.00.

The first portion of the book covers the composition and impurities of air and their relation to human life. The problem of ventilation is dwelt upon, and very proper reference is made to the faulty argument so often advanced that, because carbon dioxide is heavier than air, that therefore the proper method of securing its removal from living rooms is to provide exits for it near the floor. The public forget that the gas, as the sanitarian meets it, is warm, not cold; and that, moreover, the principle of gaseous diffusion has caused a more or less complete mixture of all the gases present in the room.

Chapter IV. gives well stated methods for air analysis.

Some eighty pages are given to the subject of water, its source, properties, relation to health and the methods employed for its examination.

Following the directions for the 'determination' of each item in water analysis, there is found a paragraph entitled 'Notes,' wherein are given in a very acceptable form the sundry hints and cautions so necessary for the guidance of the beginner. An excellent statement is found on page 81, to wit: "The value of a water analysis is in direct proportion to the knowledge and experience of the one who interprets it."

Again, on page 66, "The conclusions are not infallible, but there are enough unavoidable

risks in human life without taking unnecessary ones."

This is very true. The analyst should ever stand between the public and a questionable supply, and the consumer, rather than the water purveyor, should be given the benefit of any doubt.

The book closes with a consideration of the adulteration and examination of milk, butter, cereals and fermented liquors.

The authors have had so large and varied an experience with the subjects upon which they write, that the excellence of the present contribution to sanitary literature was to have been expected.

WILLIAM P. MASON.

#### BOOKS RECEIVED.

*Qualitative Chemical Analysis.* ALBERT B. PRESCOTT and OTIS C. JOHNSON. New York, D. van Nostrand Co. 1901. Pp. xi + 420.

*Tierleben der Tiefsee.* OSWALD SEELIGER. Leipzig, Wilhelm, Engelmann. 1901. Pp. 49. Mk. 2.

*Monographien aus der Geschichte der Chemie.* Vol. VI. Pt. 2. Christian Friedrich Schönbein, 1799-1868. GEORGE W. A. KAHLBAUM and ED. SCHAEER. Leipzig, Barth. 1901. Pp. xii + 331. \$9.30.

*The Induction Motor.* B. A. BEHREND. New York, Electrical World and Engineer. 1901. Pp. 105.

#### SCIENTIFIC JOURNALS AND ARTICLES.

*The Journal of Physical Chemistry*, April. 'On an Improved Method of determining Latent Heat of Evaporation and on the Latent Heat of Evaporation of Pyridin, Acetonitril, Benzonitril,' by Louis Kahlenberg. Description of an improvement on the Berthelot apparatus for determining the latent heat of evaporation, in which the liquid is boiled by an electrically heated platinum spiral, and the results obtained by its use. 'A Class of Relations between Thermal and Dynamic Coefficients,' by George H. Burrows. 'Minumum Boiling-Points and Vapor Composition, II,' by Morris R. Ebersole. A study of acetone-benzene solution, with a classification of all mixtures of two solvents which have been studied, according to vapor-pressures and boiling points. 'On Clapeyron's Equation,' by Paul Saurel. 'Note on the Fundamental Equations of Multiple Points,' by J. E. Trevor.

In the *American Geologist* for March, S. W. McCauley presents a discussion on the 'Trap Dykes of Georgia.' He states that they are all of the same age, and vary from an inch to two hundred feet in width and extend from a few rods to many miles. The 'Plan of the Earth and its Causes,' by J. W. Gregory, is continued from the February number, in which the writer concludes that the plan of the earth may be attributed to the unceasing shrinkage of its internal mass. Professor E. W. Clappole contributes some interesting notes on 'Petroleum in California.' 'Some Salient Features in the Geology of Arizona' is discussed by William P. Blake. This is followed by 'The Lake Systems of Southern Patagonia.' The author of this article divides the lakes into three classes—residual or salt lakes, glacial and tectonic. The April number contains a valuable contribution to the geology of 'The Piedmont Plateau of Georgia,' by Thomas L. Watson. The rocks of the region are divided into three different kinds, viz., the even-grained, massive granites, the porphyritic granites and the granite-gneisses. Of the even-grained granites, all but two possess biotite as a principal element, while hornblende is entirely wanting; the porphyritic granites are, with one exception, massive, with a composition somewhat similar to the massive granites, and in some places showing a gradation from one to the other; the granite-gneisses form extensive areas of schistose rock, similar in composition to the other two, and are believed to be metamorphosed eruptive granites. The author, after furnishing considerable proof, concludes that the region consists of eruptive granite which has been subject to the action of metamorphism and weathering, thus differentiating into the other two kinds of metamorphic rock. The age of the area is supposed to be Archæan, but it is crossed by numerous dykes of a later origin. Mr. Oscar H. Hershey contributes a paper entitled 'California Metamorphic Formations,' in which he describes the formations of the Klamath mountain region. He concludes that the schists of the upper region are somewhere between the Archæan and Devonian in age, and favors the earlier rather than the later date. This is followed by a paper, 'Fossils near Montreal,'